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TEN DAYS' BIRD STUDY IN A NEBRASKA SWAMP.

*An Account of the Feeding Habits of the Bitterns and
Swamp Blackbirds.*

BY IRA N. GABRIELSON.

On the Nebraska side of the Missouri River, just across from Sioux City, Iowa, lies Crystal Lake, one of the typical ox-bow lakes formed by that stream. Between the north end of the lake and the river much of the territory is low and swampy and, in times of flood, covered with water. Just west of the town of South Sioux City there remains a large swamp almost entirely filled with wild rice, cat-tails and bulrushes. Open water is found in only one or two places. Along the eastern edge of the swamp is a sparse growth of willows and a little further back an occasional patch of wolf-berry and other bushes. On the south is a tract of timber, mostly of such trees as box elder, willow, and cottonwood, covering several acres. Scattered here and there throughout the tract are patches of tangled vines and shrubs of various species. In this region are found certain swamp loving birds in abundance.

In late June and early July of 1913, Mr. Howard Graham

and the writer spent ten days studying the birds of the swamp. We were unable to put in the entire time at the work but spent the greater part of each day there. A boat was secured, and an umbrella blind was erected on it. The boat proved to be leaky and we spent some time each day in bailing. Of course this interfered with the work to some extent. The worst trouble was with the wind, which blew so violently during each afternoon that we were unable to see anything from the blind. The heat at times became almost unbearable on account of the excess moisture in the air.

We started investigations on June 26 when we explored the eastern and southern sides of the swamp, but did not cover the northern or western parts on account of lack of time. On all sides of us we could hear cries of young birds and old. Black terns circled over our heads screaming and sailing directly at our faces only to turn aside just before reaching us. We found nests of several species and a number of those of the Yellow-headed Blackbird, the one we particularly wished to study. On the twenty-eighth we returned to the swamp, placed the blind on the boat and anchored it securely between the nests of a Bittern and a Yellow-headed Blackbird. From this time one of us was at the swamp most of the time until July 7 when we finally left.

We wished to study as many of the common nesting species as possible and succeeded in getting more or less data on the Bittern, Least Bittern, and Yellow-headed and Red-winged Blackbirds. The cramped position necessary in the blind compelled frequent relief, and during the periods of freedom from the blind we searched the swamp or timber for nests. During the time of the study we noted the following species of birds in the swamp or in the timber and bushes around the edge. The list could have been somewhat extended by a more careful search of the timber, as in past years a number of species have been noted breeding which were not noted during the study. Almost all of the species noted in the present report have been found nesting there at some time or other although not necessarily in the time of the work. Their presence is however good indication that they were nesting

again. Lack of time prevented a thorough search for nests. The following list of species was noted:

1. *Podilymbus podiceps*. Pied-billed Grebe. Abundant resident. Nests with eggs and young of all sizes were found during our stay. Often while we were in the blind a family of young grebes, accompanied by one of the parents, swam almost up to the boat. They seemed to be feeding on aquatic insects and vegetable matter.

2. *Hydrochelidon nigra surinamensis*. Black Tern. Present in considerable numbers. We found no nests, but thought from their actions they were breeding in the north end of the swamp.

3. *Querquedula discors*. Blue-winged Teal. One or two pairs nesting. We did not find any nests but saw one pair with young while we were in the blind. We could not count the number of the brood, as some of them were concealed by the weeds.

4. *Botaurus lentiginosus*. Bittern. One nest found and studied.

5. *Ixobrychus exilis*. Least Bittern. One pair nested and were watched for one day.

6. *Butorides virescens virescens*. Green Heron. One noted almost daily feeding on the small frogs, which abounded in great numbers. Did not find any nest, but have noted them in other years nesting in the willows along the shore.

7. *Rallus elegans*. King Rail. One individual noted several times.

8. *Porzana carolina*. Sora. Common. Noted every day, but did not find any nests.

9. *Fulica americana*. Coot. Abundant. A large number of nests found, and young of all ages noted. It was seldom during the day that the grating note of this species could not be heard or a number of them seen from the blind.

10. *Oxyechus vociferus*. Killdeer. Not common. One or two could usually be seen feeding along the east shore.

11. *Colinus virginianus virginianus*. Bob-white. Occasionally heard calling from the timber south of the swamp.

12. *Zenaidura macroura carolinensis*. Mourning Dove. Noted daily feeding along the shore and found nesting in the timber on July 1.

13. *Circus hudsonius*. Marsh Hawk. A nest found July 1 in a damp meadow southwest of the swamp. The four young were almost full grown and ran off through the grass as we approached.

14. *Otus asio asio*. Screech Owl. Heard calling from the timber.

15. *Ceryle alcyon*. Kingfisher. One occasionally flew across the swamp to the open water and fished there. The species did not nest about the swamp, but came to it from the Missouri River some distance north.

16. *Dryobates pubescens medianus*. Downy Woodpecker. Noted July 1 in the edge of the timber, where it was probably breeding.

17. *Melanerpes erthrocephalus*. Red-headed Woodpecker. Noted daily along the eastern side of the swamp.

18. *Colaptes auratus luteus*. Northern Flicker. Common.
19. *Tyrannus tyrannus*. Kingbird. One pair nested in the willows on the eastern shore.
20. *Myiochanes virens*. Wood Pewee. One noted in the timber July 1.
21. *Cyanocitta cristata cristata*. Blue Jay. Common in the timber.
22. *Corvus brachyrhynchos brachyrhynchos*. Crow. One or two pairs had evidently nested in the tall trees in the timber. A few came every day and hunted frogs along the shore.
23. *Molothrus ater ater*. Cowbird. Found feeding along the shore. Eggs found in the nests of the Yellow Warbler and Red-winged Blackbird.
24. *Xanthocephalus xanthocephalus*. Yellow-headed Blackbird. Abundant.
25. *Agelaius phoeniceus phoeniceus*. Red-winged Blackbird. A few pairs were nesting along the edge of the swamp.
26. *Sturnella neglecta*. Western Meadowlark. One individual noted almost daily on the eastern side.
27. *Icterus galbula*. Baltimore Oriole. Noted on several different days along the eastern shore in the willows.
28. *Quiscalus quiscula aeneus*. Bronzed Grackle. Appeared daily in varying numbers to feed along the shore. Did not nest in the immediate vicinity of the swamp, but nests commonly in the surrounding territory.
29. *Astragalinus tristis tristis*. Goldfinch. Common.
30. *Chondestes grammacus grammacus*. Lark Sparrow. Two noted on June 26 as we approached the swamp.
31. *Spizella pusilla pusilla*. Field Sparrow. Breeding commonly in the wolfberry patches.
32. *Pipilo erythrophthalmus erythrophthalmus*. Towhee. One male seen June 26 on the edge of the timber.
33. *Zamelodia ludoviciana*. Rose-breasted Grosbeak. Noted daily about a large cottonwood on the east shore.
34. *Passerina cyanea*. Indigo Bunting. July 26 a nest containing three eggs was found in one of the wolfberry bushes.
35. *Spiza americana*. Dickcissel. Nested commonly in the bushes around the swamp.
36. *Hirundo erythrogastra*. Barn Swallow. Numbers of this species were constantly flying over the water. They nested in some abandoned buildings on the east side.
37. *Vireosylva olivacea*. Red-eyed Vireo. Noted July 1 in the timber.
38. *Vireosylva gilva gilva*. Warbling vireo. A pair evidently nested in a boxelder in the edge of the timber, as they could be seen there every day.
39. *Dendroica aestiva aestiva*. Yellow Warbler. Nested commonly.

40. *Geothlypis trichas trichas*. Maryland Yellow-throat. Common.
41. *Dumetella carolinensis*. Catbird. Nests found in the timber July 1.
42. *Toxostoma rufum*. Brown Thrasher. Nests found in timber July 1.
43. *Troglodytes aedon parkmani*. Western House Wren. Common.
44. *Telmatodytes palustris iliucus*. Prairie Marsh Wren. Nested commonly.
45. *Penthestes atricapillus atricapillus*. Chickadee. Common in timber.
46. *Planesticus migratorius migratorius*. Robin. Noted commonly feeding along the shore.

The original object of this work was to obtain data on the food of the nestling Yellow-headed Blackbirds. The trip on June 26 revealed many nests in all stages, and the work was started on the twenty-eighth. On that date the blind was fixed on the boat and a search made for a nest with nestlings a day or two old. While engaged in this search we came upon one containing young of about four to six days old. This nest was located about eight or ten feet from a Bittern's nest containing five young. We decided to place the blind between the two and attempt a "double barreled" study. A Least Bittern's nest containing five eggs was marked for future study and the work was completed with a short study of the Red-winged Blackbird. The data obtained from the study of these four species will be presented in the following paragraphs.

YELLOW-HEADED BLACKBIRD. (*Xanthocephalus xanthocephalus*).

The Yellow-headed Blackbirds were by far the most abundant breeding form of the swamp. In the part examined there were probably several hundred nests; in the remaining half of the swamp the number is only a matter of conjecture. The nests which we examined were practically identical in location, being built in the wild rice growing some distance from the shore. They were woven in basket shape about three or more stems from eighteen inches to two and one-half feet above the water. The water in the region of the nests was about hip deep and they seemed to be confined to a belt

of this depth around the part of the swamp studied. This lay quite close to the south and east shores and was, as far as our investigations extended, the deepest part. A belt of water of this depth about one hundred yards wide lay in a half moon shape along these shores while the center was much shallower, being in many places not over eighteen inches deep.

The period of nidification was represented in the colony in nearly all of its stages from nests in which the clutch was not yet completed to almost fully grown fledglings. The cries of the young could be heard on all sides but it was difficult to distinguish one from his surroundings after he was in the weeds. One of the surprises of the study was that of learning the extremely early age at which the young left the nest. In the first brood studied, the young left before the end of the first day's observations. At the time they were in the pin feather stage of development and very few of the feathers had even begun to show beyond the sheath. That these nestlings did not leave any earlier on account of the blind was proved by the finding of a number of others in the same stage sitting on the broken down reeds scattered through the swamp. It seemed to us at first as if the obscurity of the reeds was much safer for the young than the nests, which were at times rather conspicuous, but later developments served to shake our faith in this explanation.

On the morning of June 29 at 4:00 A. M. the blind, erected between the Blackbird and Bittern nests, was entered by Mr. Howard Graham and the writer. Watch was kept on both nests and we soon had proof that the parents had not deserted them. The female Yellow-head fed one of the nestlings at 4:35, or about thirty minutes after the blind was entered. Constant observations were carried on until 4:30 P. M., at which time the wind blew the reeds about so violently that it was impossible to see either nest more than a fraction of the time. The action of the wind also made it difficult to see out of the opening in the blind at all times, so the work was closed for the day. This nest will be called nest A.

July 3 the blind was placed in position at another Yellow-head's nest containing three young. The work was begun at

7:30 A. M. on July 4 and continued until 4:30 P. M., when observations were again stopped by the wind. At the end of the day the blind was taken back to the Bittern's nest to continue the work there. This nest will be referred to as nest B.

In spite of the comparatively small amount of data secured in these two short studies, several facts were noted. In both cases the female did all the feeding, neither male approaching the nest. The males were apparently in little fear of the blind as they sat in the weeds only a few feet from it and uttered the harsh notes characteristic of the species. On several occasions the chosen perch was one of the stakes used to anchor the boat. This of course does not prove that the male never feeds but it is worthy of record that with scores of Yellow-heads of both sexes feeding and foraging about the blind we never saw a male carrying any insects away although many females were often found to do so. The males were seen hunting but always promptly devoured the insects caught. The total number of feedings recorded was thirty-eight for nest A and twenty-five for nest B. Table I will show the character of the food given to the two broods.

TABLE I.
NESTLING FOOD IN NESTS A AND B.

<i>Food.</i>	<i>Nest A.</i>	<i>Nest B.</i>	<i>Total.</i>
Unidentified	*15	1	16
Dragon fly	4	0	4
Larvae	4	0	4
Mayfly	27	19	46
Grasshoppers	0	4	4
	—	—	—
Totals	50	24	74

The amount of data here presented is too small to permit of any conclusions concerning the food of the nestlings of the species and yet several important facts are revealed by the study.

*An attempt to continue the observations after the wind became bad explains the large number of unknowns. At nest B the blind was closed as soon as the wind made it impossible to see the nest.

It will be noted that mayflies constituted 62.16 per cent of the total and it is not improbable that most of the sixteen unidentified forms were also mayflies as the blowing about of the reeds prevented our determining the insect fed. This evidence tends to support strongly the statement made in a previous paper* that the food of the nestlings is largely determined by the accident of nest location.

The surroundings of these nests presented no variety. For a considerable distance about the nest, the conditions of shade, moisture, vegetation, and temperature were the same, and the insect species were of course limited to those forms favored by such conditions. As far as we could discover, mayflies and dragon flies were the only forms commonly found. These were clinging to the stems and leaves of the aquatic plants and the blackbirds secured them from these places. They seldom went far from the nest in their hunting and much of the time we could see them climbing about picking up insects until two or three were captured, when they flew to their nests with them.

In the sanitation of the nest the same care was found as in other species, the excreta never being allowed to touch the nest. It was taken directly from the young and carried away. It was rarely devoured, being disposed of in this manner only once in the two days. In nest B the three nestlings received about equal shares, being fed nine, eight, and seven times, respectively. The one which received the greatest number of feedings died in the afternoon and was carried away by the female on the last visit at 3:51 P. M. In nest A the young left the nest during the day and of course no comparison between their food is possible.

The method by which the young left the nest was interesting. At 5:38 A. M. one of the young clambered to the edge of the nest, seized one of the supporting reeds with each foot and climbed up them a short distance above the nest, advancing each foot alternately. After going about eighteen inches, the bending of the stalks under his weight brought

*Nest Life of the Catbird. *Dumetella carolinensis*. By Ira N. Gabrielson. Wilson Bul., Vol. XXV, Dec., 1913.

them in contact with others onto which he went. After traveling in the tops for a little way, he commenced to work toward the water, and reaching a broken reed rested a while. In a few moments he proceeded along this reed to another and was soon out of sight. The second nestling left at 7:00 A. M. in the same manner, and the third started several times but returned and was still sitting on the edge of the nest when the blind was closed for the day.

I had one glimpse of some of the dangers to which the young Yellow-heads are exposed. One of the young from a neighboring nest was sitting on a reed about two inches above the water when the jaws of a hungry pickerel rose from the water and the nestling disappeared. It was done so quickly that if I had not been looking directly at the bird it would never have attracted my attention. It is probable that others meet the same fate. Several times I noted fledglings that had just left the nest fall into the water. They managed to crawl out on a convenient reed but some may lose their lives in this way.

RED-WINGED BLACKBIRD. (*Agelaius phoeniceus phoeniceus*).

During the season of 1913 the Redwings were few in number, only four nests being found in the part of the swamp examined. As a usual thing the nests are placed in the flags or cat-tails, but all of these were in small willows from three to eight feet high, growing just in the edge of the water. No others of this usually abundant species were noted, and apparently the four pair were all that were in the southeastern half of the swamp. In all swamps where I have found both of the marsh blackbirds the same distribution has been noted; i. e., the Yellow-heads occupied the body of the swamp and the Red-wings the edges. As far as my experience goes the former always builds over deep water. The latter, however, is more variable, building along the edge or farther out in the swamp indiscriminately when the Yellow-head is absent, and occasionally nesting in fields quite remote from any water.

At noon on July 3, a small blind was erected at a Red-wing's nest which contained four young. The nest was discovered July 1 and held at that time three young and one egg. At 2:30 P. M. of the third, an attempt was made to begin the study but the birds had not yet become reconciled to the presence of the blind and would not approach at all. At 7:30 A. M. of the fourth, observations began and were continued until 4:30 P. M., when the high wind began to interfere to such an extent as to make further work unprofitable. As we approached, the male greeted us with his "Con-quer-ree" from the top of the blind, and he continued to use it during the day as a perch, either hopping about the top or swinging on one of the guy ropes. The female did all the feeding throughout the period of observation, the male contenting himself with watching the nest from one of his perches on the blind. At the approach of any person he left his perch and circled about his head, keeping it up until he had passed some distance beyond the nest.

During the day the young were fed fifty-one times. One of the four was dead at the time the work was started but remained in the nest until 3:00 P. M., when the female seized it and carried it away.

TABLE II.

FOOD OF NESTLING RED-WINGED BLACKBIRDS.

<i>Food.</i>	<i>Number.</i>
Unidentified	12
Wireworms	11
Cricket	1
Beetle	3
Mayfly	2
Fly	3
Green worms	4
Grasshopper	20
Moth	3
Spider	1
Tomato worms	4
Measuring worm	1
	—
Total	76

The noteworthy thing about these data is the great variety of food used. Apparently the factor of nest location has again been the one which determined the nestling food. The conditions of shade, soil, vegetation, and moisture are varied. The nest was located at the water's edge, and at this point the land sloped rapidly up from the swamp and was covered by a heavy growth of willows and wolfberry bushes. There were at least four readily distinguishable zones in which the conditions mentioned varied: first, the water surface, filled with flags, arrowhead lilies, and, further out, cat-tails and wild rice, furnished mayflies, dragon flies, with an occasional grasshopper; second, the shore line, a zone of from three to five feet in width covered with decaying vegetation and bits of sticks, contained principally beetles and crickets; third, a narrow strip of grass covered territory lying between the shore and the bushes; and fourth, the bushes. The last two zones contained great numbers of insects of various species with grasshoppers the most numerous. These two furnished the greater part of the insects fed and seemed to be the favorite hunting ground of the female. The result of these varying conditions is the use of a variety of species as food instead of practically only two or three as the Yellow-heads did. The Red-wings foraged within a comparatively small area about the nest. The female never became quite reconciled to the presence of the blind and always came to the nest in a quick nervous way and, after inspecting it, fed hurriedly. The young did not raise the posterior end of the body in voiding the excreta and the parent was compelled to probe in the nest for it. Always on leaving the nest the female uttered a call much like that of the cowbird and one that I never before had heard a Red-wing use.

AMERICAN BITTERN (*Botaurus lentiginosus*).

As far as we could discover there was only this one pair nesting in the swamp. The nest, which was discovered on June 28, contained five young several days old. The nest was built in water about three feet deep in a heavy growth of rushes. It was simply a floating platform of reeds with

no attempt to make a nest depression in the top. It was loosely woven about several upright stems which served to anchor it in place. Leading away from the nest were two distinct paths which ended from twenty to thirty feet away. The parent never flew directly to the nest but dropped into the end of one of these paths and came stalking cautiously to it. In leaving she always followed the other path and took wing from the end of it. The paths were marked by a broken and trampled line of vegetation and ended in a small platform. Our boat was placed directly across the path for leaving, and we had an opportunity to watch the building of a new one. On the first visit noted she walked off through the wild rice to the east of the nest, grasping the upright stalks with her feet and climbing from one to another. Her weight broke numbers of them and made the beginning of the trail. After going about twenty-five feet, she commenced to break other stalks down and lay them in a pile. Some were already in the water and she soon had a platform capable of sustaining her weight. The reeds were seized in the beak and broken with a quick sidewise jerk of the head. When the platform was finished, she stepped upon it and stood there for a time before she flew away.

During the watch on the twenty-ninth we saw her feed only once and then did not get to see the entire process as she entered quietly while we were watching the blackbirds and had nearly finished feeding when we noticed her. We were afraid the young would suffer for food on that day and undertook to feed them. If there was one conspicuous thing about the life in the swamp, it was the frogs—little fellows some of them with the remains of a tail still visible. The shore from three to five feet from the water's edge was simply carpeted with them and a person walking along the shore apparently sent almost the entire surface leaping into the water. It was an easy matter to secure a number with the aid of a stick, and we soon had between fifty and sixty in a couple of cans. When these had all disappeared down the five gaping throats in two feedings, about an hour apart, we thought we understood the necessity for such great numbers

of frogs. As Graham remarked, "It's a good thing there is such a fine crop of frogs and only this one Bittern family around. If the frogs were any less or the Bitterns any more plentiful, there would be a famine in the Bittern tribe."

Only the female came to the nest, although the male was often heard "pumping" in the surrounding reeds. We noted one fact in connection with the Bittern's hunting not noted in any other bird studied, and that was the distance from the nest of the regular hunting grounds. All other birds studied forage in the immediate vicinity of the nest while the Bittern went across the end of the swamp at least a half a mile from it. The nearest shore line and the place where we obtained the frogs was not more than a hundred yards away and the frogs fairly swarmed there. She was never noted feeding along this shore but flew across the swamp to a grass grown point covered with about two inches of water. One day I went around to this point and concealed myself in the willows to watch while Mr. Graham remained in the blind. The Bittern soon came flying from the direction of the nest and dropped into the grass a short distance from me and immediately became stationary. The frogs, which were as thick here as on the other shore, soon forgot her presence and began to swim about or climb over the bogs. When one came within reach, out shot the long neck and beak and seized him. He was hammered against a bog a few times and swallowed. After securing a number in this fashion she stepped up onto a bog and went to sleep. After a short rest she flew a little ways down the shore and went to hunting again. After her hunt and rest this time she flew heavily across the swamp toward the nest. Her disinclination to hunt on the nearer shore probably arose from the fact that it was frequented by boys much of the time and not from any aversion to hunting near the nest.

It was not until July 1 that we secured a good description of the complete feeding process. The following extract is from the note book used on that occasion: "At 9:55 A.M. I heard the flapping of heavy wings and the female settled down into the rushes about twenty feet from the nest. She

consumed ten minutes in covering that distance, advancing a few steps and then remaining motionless for a time. When only four or five feet away, she stopped for five minutes, remaining, as far as I could see, absolutely motionless, and then, apparently satisfied, stepped up to the nest. She progressed by grasping the upright stems of the aquatic plants and when she stopped to listen looked as though she were on stilts. As soon as she reached the nest, the young commenced jumping at her beak, continuing this until one succeeded in seizing it in his beak at right angles to the base. A series of indescribable contortions followed, the head of the female being thrown jerkily in all directions and the muscles of the neck working convulsively. Finally her head and neck were placed flat on the nest for several seconds and then slowly raised again. As it came up the food came slowly up the throat into the mouth. As the food passed along the beak, the open beak of the young bird followed its course along until it slid into its mouth and was quickly swallowed. The young one then released his hold and the parent stood with the muscles of the neck twitching and jerking. The remaining young kept jumping at the beak until one secured a hold on it, when the process was repeated. By 10:30 all five of the brood had been fed. Each one after receiving the food staggered across the nest and lay down with the head and neck flat on the weeds and remained in this position for some time before showing any signs of life again." After the feeding the parent walked away and built the platform described elsewhere. She rested here until 11:15 and then flew away. On the sixth of July the young had become well feathered out although the natal down was still conspicuous on the head and neck. It was impossible to do any more work with them after this time as they began going out in the swamp to meet the parent, receiving the food there and returning to the nest. On July 1 the nest was under observation from 8:00 A. M. until 4:30 P. M. and the young were fed three times during that period, making from five to eight feedings the probable number for the day. Each time all five young were given a mass of food about the size of an

English walnut. In its quick passage from the parent to the young it was not possible to determine much as to its nature except to discern an occasional frog's leg. When last noted they were still being fed by regurgitation. It would be interesting to know how long this method of feeding is continued but we were unable to follow the fortunes of this Bittern family any further.

An observation made in 1910 may be of some interest in this connection. While a piece of wild hay was being cut, a nest of this species was uncovered and four of the five young were killed before the team could be stopped. A small patch of hay was left standing about the nest and the young one placed in it. At this time he was fully feathered out but was unable to fly. The next day the parent was noted flying into the patch of hay without anything in her beak. After she left I walked over and approached the young one, who immediately started to run. Seeing that he could not escape he stopped and disgorged the contents of his stomach. An examination showed one garter snake about sixteen inches long, a meadow mouse and three crayfish, all partially digested. This observation seemed to prove that at this age the young were still being fed by regurgitation.

During the time the nest was under observation, a number of interesting facts were noted in connection with behavior. One thing which struck us very forcibly was the apparent readiness of the parent to abandon the young at the approach of any person. She made no attempt to defend them but stalked stealthily away at any slight noise or movement. This made it necessary to sit absolutely motionless in the boat while she was at the nest and as she frequently remained for an hour or more it became decidedly uncomfortable. Any slight movement would cause the boat to tip and at this she was gone in a flash. Several times she approached to within a few feet of the nest and was frightened away by some slight motion of the blind. On these occasions she generally remained away for from three to four hours. This is not always true of the Bitterns as I have had them remain on the nest and almost allow me to touch them and have had

them try to frighten me away by ruffling up the feathers and making a funny hissing sound.

The actions of the young were very interesting and were in direct contrast in many ways to all other young birds with which we were familiar. No sound was ever made on the approach of the parent beyond a slight hissing, barely audible in the blind four feet away. This was very different from the young Yellow-headed Blackbirds on all sides of them, who could be heard almost constantly begging for food. During the absence of the parents, however prolonged, no outcry was ever made by the young Bitterns unless one of us went out of the blind and tried to touch one of them. When we did this they backed away from us, uttering a curious hissing sound and pecking viciously at our fingers. It was interesting to note the change in their actions after the parent left the nest. For perhaps ten minutes they remained in the position assumed after feeding, as described above. At the end of that time they commenced to raise their heads and look around. For the next hour they sat contentedly on the shaded side of the nest, occasionally dipping the tip of the beak into the water but never drinking anything. In the next half hour they began to grow uneasy and to keep watch for the parent. Every blackbird that flew above the nest caused each head to rise to its full height and silently watch his flight across their horizon. At times they seized each others' beaks in the same manner as the parent's was held. At other times they seized the reed stems crosswise and pulled vigorously on them, sometimes working the mandibles as if chewing. This continued until the return of the parent, when all would assemble on one side of the nest and watch her approach through the reeds. No sanitary measures were noted, and the nest became a rather unpleasant smelling place before our work was finished.

LEAST BITTERN. (*Ixobrychus exilis.*)

The Least Bittern nest, which was located on June 26, contained five eggs. On July 4 two eggs had hatched and on the sixth all but one. The blind was put in place on the

evening of the sixth, and we watched this nest most of the day on the seventh. In marked contrast to the timidity of the Bittern, these birds were devoid of fear. While we hauled the boat and blind in place and drove stakes to anchor it, the female sat quietly on the nest. And when we removed the blind, the male gave an exhibition of equal fearlessness by sitting on the nest through it all and pecking angrily at our fingers when we tried to touch him. On July 7 at 8:00 A.M. I entered the blind. The female was on the nest and did not leave until I stepped into the boat, causing the blind to tip suddenly toward her. At this she stepped off from the nest and walked some five or six steps. After remaining there watching the blind for about thirty minutes she returned. The nest was a small platform built in the rushes and back of it was a mass of broken down vegetation which formed a platform several feet square. This the Bitterns used as a landing place. The fifth egg had hatched and the shell was gone when I entered the blind, although the nestling was not yet dry. One or the other of the parents kept the nest covered throughout the day and both assumed the same position. They sat on the nest with the wings spread in such a manner as to give the body a curious flattened appearance while the head and neck were extended to their full length with the beak pointing straight in the air. Occasionally the head was lowered for an instant to examine the young but almost immediately was raised again. Every bird that flew by was watched and every movement in the surrounding vegetation seemed to be noted by the bird on the nest. This position had the advantage of elevating the eyes some distance above the nest and gave the bird a better view of what was going on around.

I was curious to see how these newly hatched young would get their food; to see if they were fed as the young American Bitterns had been. At 10:50 the bright colored little male alighted on the platform behind the nest and stood there watching the female who was on the nest. From time to time he allowed the beak to hang open and shook his head in a comical way. After he had been doing this for ten

minutes, the female stepped from the nest and flew away. The male took her place and stood, still shaking his head. All of the brood, *including the one just hatched*, were jumping at his beak. Finally one of them succeeded in securing a hold on it and pulled his head down toward the nest. His beak was seized at right angles by that of the young as in the case of the American Bittern. Instead of the violent contortions which preceded the act of regurgitation in the other species, a few convulsive jerks of the throat and neck muscles brought the food into the mouth, from which it passed into that of the young in the same manner as before. The food instead of being in a compact mass was more of a liquid containing pieces of small frogs and occasionally whole ones. These nestlings had not yet become proficient in their strange manner of feeding and more or less of the food material fell into the nest. When this happened, the young which were not receiving food at the time seized it and swallowed it. When two secured a hold on the same frog, an exciting tug of war followed until one or the other was victorious. All five young were fed at each visit, and it seemed to be as instinctive for them to jump at the beak of the parent as it is for other young birds to raise the opened beak.

During the day the male and female alternated in the care of the nest but the brooding periods of the latter were much the longer. She seldom remained away any length of time. On the other hand the male did all the feeding, four times, during the day. The female evidently hunted only for her own food during her absences from the nest while the male foraged for both the nestlings and himself. Both parents did their hunting on an extensive mud flat about two hundred yards from the nest.

No attempt was made at sanitation during our brief study, the excreta being allowed to drop on the nest or fall into the water beneath. The unconcern of the parents at our presence made them the most interesting of all the birds studied and it was with regret that we removed the blind and closed the work.

Marshalltown, Iowa.